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CASE REPORT

G. Sani
F. Benetti
M. A. Mariani
G. Lisi
M. Maccherini
M. Toscano

Arterial myocardial revascularization without cardiopulmonary bypass through a small thoracotomy

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G. Sani · M. A. Mariani (✉) · G. Lisi · M. Maccherini · M. Toscano
Institute for Thoracic and Cardiovascular Surgery, University of Siena, Nuovo Policlinico "Le Scotte", Viale Bracci, I-53100 Siena, Italy

F. Benetti
Benetti Foundation, Buenos Aires, Argentina

Abstract The opportunity to obviate the risks associated with cardiopulmonary bypass (CPB) while maintaining the long-term survival previously demonstrated with the use of arterial grafts, led us to perform myocardial arterial revascularization without CPB, using a small left thoracotomy as the surgical approach. One patient was operated on with this technique grafting the left anterior descending artery with the left internal mammary artery and grafting sequentially the first diagonal branch and the first marginal branch with a T-graft of radial artery. A small anterolateral thoracotomy was performed and the proximal harvesting of the left internal mammary artery was video-assisted by thoracoscopy. No hemodynamic deterioration occurred during the procedure. The patient was discharged on postoperative day 5 and the postoperative course was uneventful.
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Key words Coronary artery bypass · Cardiopulmonary bypass · Composite arterial grafts · Left thoracotomy · Internal mammary artery

Introduction

In spite of continuous improvements in perfusion techniques, the potential for morbidity and mortality associated with CPB remains significant. The need to avoid these hazards can explain the rising interest in coronary surgery without CPB [1–3] and has led us to introduce this technique in our Institute. In addition, the opportunity to achieve a complete myocardial revascularization is given by the use of composite arterial conduits [4–5], thus avoiding the need for aortic anastomoses. In this report the possibility of performing coronary surgery without CPB using arterial grafts is demonstrated, through a small left thoracotomy, using video-assisted thoracoscopy in order to help with harvesting of the left internal mammary artery.

Case report

A 70-year-old Caucasian male was admitted for surgical treatment of coronary artery disease with symptoms of stable angina (CCS III class). Coronary angiography showed significant stenosis of the left anterior descending artery, first diagonal and first marginal branches (Fig. 1) and the left ventricular ejection fraction was 62%.

After the left radial artery has been harvested, the patient was positioned in a 30° right lateral decubitus and (Fig. 2) an anterolateral thoracotomy (10 cm in length) was performed through the 5th intercostal space. A video-thoracoscope was introduced through the 6th intercostal space (anterior axillary line) to harvest the proximal part of the left internal mammary artery. During the procedure the left lung was deflated by means of a double-lumen endotracheal tube.

The pump was prepared, but not primed, and the perfusionist was on stand-by in the operating room. The pericardium was opened for a length of 5 cm just above the second portion of the left anterior descending artery. The pericardial incision was then extended vertically downward in a "T"-shape to the left side towards the first diagonal and the first marginal branches. The first marginal branch was exposed pulling up the pericardium by means of two large silk stitches at both sides of the end of the vertical incision. After the administration of 1.5 mg/kg of sodium heparin, a T-graft was constructed

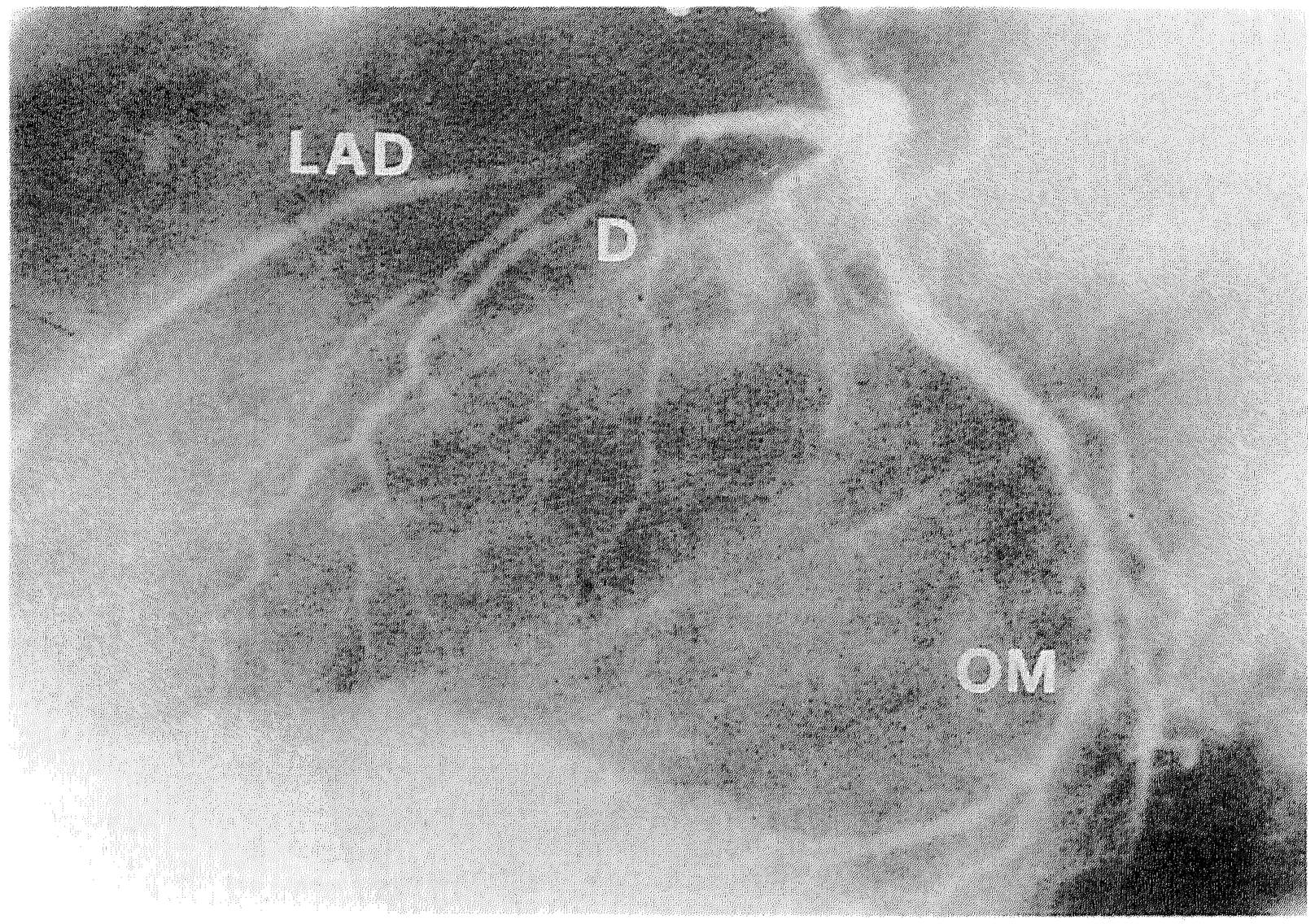


Fig. 1 Preoperative coronary angiography: coronary stenoses of the left anterior descending (*LAD*), first diagonal (*D*) and first marginal branch (*OM*) are shown

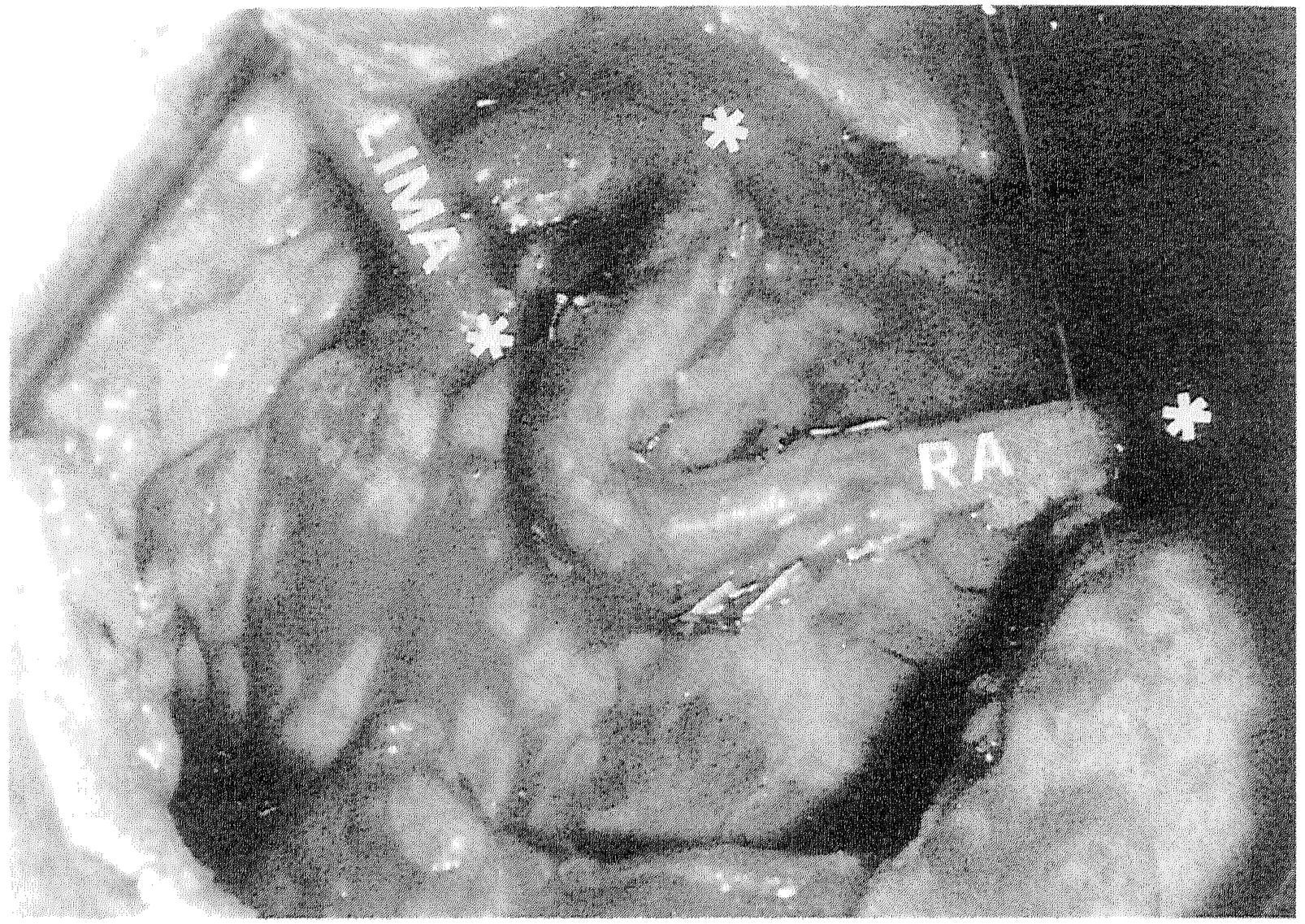
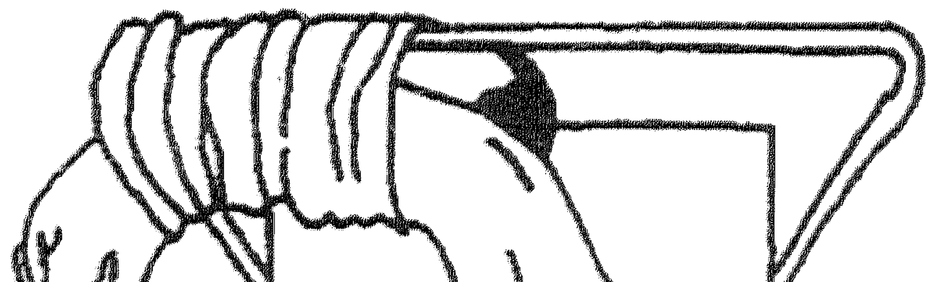
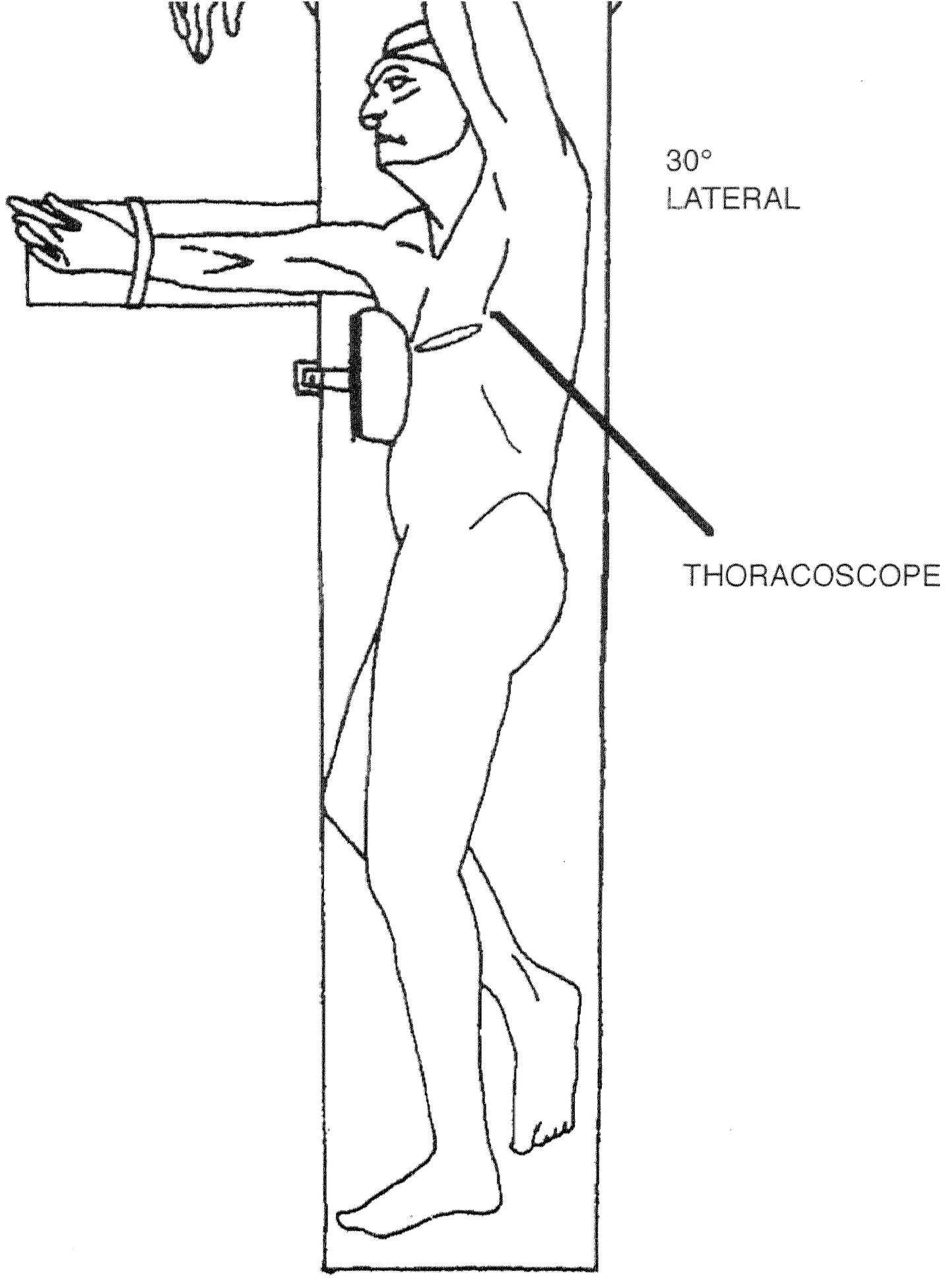


Fig. 3 Intraoperative view of the grafts: the left internal mammary artery (*LIMA*) is anastomosed to the left anterior descending artery; radial artery (*RA*) is anastomosed side-by-side to first diagonal branch and end-to-side to the first marginal branch (the *white* * indicate the sites of coronary anastomoses). The proximal end of the radial artery is anastomosed end-to-side to the upper surface of *LIMA* (upon the "*M*" of the *LIMA*)



anastomosing the proximal end of the radial artery to the side of the left internal mammary with a running 8-0 suture. Coronary anasto-



moses were then performed on the beating heart with running 7-0 polypropylene sutures, after looping two 5-0 monofilament stay sutures around the coronary artery to be bypassed, according to the technique described by Benetti et al. [1]. Optimal visualization was obtained using a "blower-humidifier" device [6], because looping sutures reduce but do not stop the flow inside the coronary artery, especially in diseased vessels where the stiff arterial wall does not allow the loop to occlude the vessel completely. The left internal mammary artery was anastomosed first to the left anterior descending artery (end-to-side), then the distal end of the radial artery was sutured onto the first diagonal branch and the first marginal branch as a sequential graft (Fig. 3).

The complete procedure took 196 min and neither hemodynamic impairment nor electrocardiographic changes occurred during this time. No intraoperative or postoperative rhythm disturbances, neither ventricular nor supraventricular, were recorded. Over the total CK ratio, MB-CK was 4%.

The postoperative course was uneventful. The patient was discharged on postoperative day 5. He refused postoperative angiogram, because he was well and his 1-month postoperative stress (treadmill) perfusion scintigraphy (^{99m}TcMIBI-SPECT) was negative for recurrent ischemia.

Discussion

Previous experiences [1–3] have clearly demonstrated the feasibility of myocardial revascularization without CPB.

Fig. 2 Patient's position on the operating table: right 30° lateral decubitus. The left arm is elevated over the head and the small thoracotomy performed at the 5th intercostal space. The thoracoscope is inserted into the chest through a hole at the 6th intercostal space

In selected cases, mainly in patients with two-vessel disease and undiseased right coronary artery, it may be possible to avoid the risks of CPB and obtain the benefits of arterial conduits, in particular using composite arterial conduits [4–5]. The use of a small left thoracotomy, along with video-assisted harvesting of the left internal mammary artery, may reduce the surgical trauma, thereby reducing morbidity and the total hospital and intensive care unit stay. The avoidance of the midline sternotomy could be useful in redo surgery, expecially when there are patent venous grafts on the anterior surface of the heart, and for aesthetic reasons in women.

References

1. Benetti FJ (1985) Direct coronary surgery with saphenous vein bypass without either cardiopulmonary bypass or cardiac arrest. J Cardiovasc Surg 26:217–222
2. Benetti FJ, Naselli G, Wood M, Geffner L (1991) Direct myocardial revascularization without extracorporeal circulation. Experience in 700 patients. Chest 100:312–316
3. Buffolo E, Gomes WJ, Andrade JC, Branco JN, Maluf MA, Palma JH, Telles CA, Aguiar LF (1994) Myocardial revascularization without extracorporeal circulation. Surgical results in 1090 patients. Arq Bras Cardiol 62:149–153
4. Calafiore AM, Di Gianmarco G, Luciani N, Maddestra N, Di Nardo E, Angelini R (1994) Composite arterial conduits for a wider arterial myocardial revascularization. Ann Thorac Surg 58:185–191
5. Tector AJ, Amudsen S, Schmal TM, Kress DC, Peter M (1994) Total revascularization with T grafts. Ann Thorac Surg 57:33–39
6. Teoh KHT, Panos AL, Harmantas AA, Lichtestein SV, Salerno TA (1991) Optimal visualization of coronary artery anastomoses by gas jet. Ann Thorac Surg 52:564–568

EDITORIAL COMMENT

G. Sani et al

Arterial myocardial revascularization without cardiopulmonary bypass through a small thoracotomy

The paper is a report on a single patient successfully operated without cardiopulmonary bypass, using complete arterial revascularization with a T-graft, a small anterolateral thoracotomy, video-assisted thoracoscopic surgery for the harvesting of the left internal mammary artery and finally a "blower-humidifier" device for optimal visualization.

The authors have to be commended with their successful operation, but some issues are not discussed and I feel the pros and cons of the tactic and technique are missing.

- Was the pathology of this case not suitable for PTCA, in order to avoid surgery completely, or could the simplified surgery be a real alternative to PTCA?
- Myocardial revascularization without cardiopulmonary bypass is not new, as acknowledged by the references 1 and 2 of the papers of Benetti. But there is no comment on the indications and results of Benetti's cases and there is no comment on the fact that this technique is not accepted worldwide.
- Total arterial revascularization is an accepted new technique, avoiding aortic anastomosis. But, with a T-graft of radial artery on the mammary artery, the flow is totally dependent of one orifice on the subclavian artery, a potential disadvantage.
- A new element is the use of video-assisted thoracoscopic surgery (VATS) for the harvesting of the left internal mammary artery, a technique actually used widely in thoracic surgery and now also adopted in cardiac surgery, especially in coronary artery bypass surgery. Using VATS for the harvesting of the mammary artery, a small thoracotomy allows access for the anastomoses.
- Optimal visualization was obtained using a "blower-humidifier" device because looping sutures do not completely stop the flow inside the diseased coronary arteries with stiff walls. But, on the other hand, visualization seems impaired by the small anterolateral thoracotomy of 10 cm length and by the beating heart.
- Extracorporeal circulation was prepared but not primed and was not necessary as this particular patient remained stable throughout the procedure. But in possibly unstable patient the authors are missing the advantages of median sternotomy and extracorporeal support provided in conventional operations.
- I acknowledge the uneventful perioperative and postoperative course of the patient and the discharge on day 5. Unfortunately the patient refused a postoperative angiogram but 1 month after the operation a stress perfusion scintigraphy showed no ischemia.

This innovative technique seems promising in selected cases and I look forward to learning more about the indications for this approach and the longer follow-up of these patients.

Prof. Dr. L. K. Lacquet
Academisch Ziekenhuis Nijmegen
414 Afd. Thorax-Hartchirurgie
Postbus 9101
NL-6500 HB Nijmegen
The Netherlands